

CLAIMS

What is claimed is:

1. An isolated polynucleotide comprising:
  - 5 (a) a first nucleotide sequence encoding a first polypeptide having 5,10-methylenetetrahydrofolate reductase activity, wherein the first polypeptide has an amino acid sequence of at least 85% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6;
  - 10 (b) a second nucleotide sequence encoding a second polypeptide having 5,10-methylenetetrahydrofolate reductase activity, wherein the second polypeptide has an amino acid sequence of at least 90% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:17; or
  - 15 (c) a complement of the nucleotide sequence of (a) or (b), wherein the complement and the nucleotide sequence consist of the same number of nucleotides and are 100% complementary.
2. The polynucleotide of Claim 1, wherein the amino acid sequence of the first polypeptide has at least 90% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6.
- 20 3. The polynucleotide of Claim 1, wherein the amino acid sequence of the first polypeptide has at least 95% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6, and wherein the amino acid sequence of the second polypeptide has at least 95% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:17.
- 25 4. The polynucleotide of Claim 1, wherein the amino acid sequence of the first polypeptide comprises SEQ ID NO:6, and wherein the amino acid sequence of the second polypeptide comprises SEQ ID NO:17.
5. The polynucleotide of Claim 1 wherein the first nucleotide sequence comprises SEQ ID NO:5.
- 30 6. A vector comprising the polynucleotide of Claim 1.
7. A recombinant DNA construct comprising the polynucleotide of Claim 1 operably linked to at least one regulatory sequence.
8. A method for transforming a cell, comprising transforming a cell with the polynucleotide of Claim 1.
- 35 9. A cell comprising the recombinant DNA construct of Claim 7.

10. A method for producing a plant comprising transforming a plant cell with the polynucleotide of Claim 1 and regenerating a plant from the transformed plant cell.
11. A plant comprising the recombinant DNA construct of Claim 7.
- 5 12. A seed comprising the recombinant DNA construct of Claim 7.
13. An isolated polypeptide having 5,10-methylenetetrahydrofolate reductase activity, comprising:
- (a) a first polypeptide wherein the first polypeptide has an amino acid sequence of at least 85% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6; or
- 10 (b) a second polypeptide wherein the second polypeptide has an amino acid sequence of at least 90% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:17.
14. The polypeptide of Claim 13, wherein the amino acid sequence of the first
- 15 polypeptide has at least 90% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6.
15. The polypeptide of Claim 13, wherein the amino acid sequence of the first polypeptide has at least 95% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6, and wherein the amino acid sequence
- 20 of the second polypeptide has at least 95% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:17.
16. The polypeptide of Claim 13, wherein the amino acid sequence of the first polypeptide comprises SEQ ID NO:6, and wherein the amino acid sequence of the second polypeptide comprises SEQ ID NO:17.
- 25 17. A method for isolating a polypeptide having 5,10-methylenetetrahydrofolate reductase activity comprising isolating the polypeptide from a cell or culture medium of the cell, wherein the cell comprises a recombinant DNA construct comprising the polynucleotide of Claim 1 operably linked to at least one regulatory sequence.
- 30 18. A method of altering the level of expression of a 5,10-methylenetetrahydrofolate reductase in a host cell comprising:
- (a) transforming a host cell with the recombinant DNA construct of Claim 7, and
- (b) growing the transformed host cell under conditions that are suitable
- 35 for expression of the recombinant DNA construct,

wherein expression of the recombinant DNA construct results in production of altered levels of the 5,10-methylenetetrahydrofolate reductase in the transformed host cell.

19. A method for evaluating at least one compound for its ability to inhibit
- 5 5,10-methylenetetrahydrofolate reductase activity, comprising the steps of:
- (a) introducing into a host cell the recombinant DNA construct of Claim 7;
  - (b) growing the host cell under conditions that are suitable for expression of the recombinant DNA construct wherein expression of the recombinant DNA construct results in production of a
  - 10 5,10-methylenetetrahydrofolate reductase;
  - (c) optionally purifying the 5,10-methylenetetrahydrofolate reductase from the host cell;
  - (d) treating the 5,10-methylenetetrahydrofolate reductase with a
  - 15 compound to be tested;
  - (e) comparing the activity of the 5,10-methylenetetrahydrofolate reductase that has been treated with a test compound to the activity of an untreated 5,10-methylenetetrahydrofolate reductase, and selecting compounds with potential for inhibitory activity.

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